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PLEASE NOTE

This report presents unevaluated information on Soviet Bloc International Geophysical Year activities selected from foreign-language publications as indicated in parentheses. It is published as an aid to United States Government research.

SOVIET BLOC INTERNATIONAL GEOPHYSICAL YEAR INFORMATION

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I. ROCKETS AND ARTIFICIAL EARTH SATELLITES

Soviets To Attempt Origin of Life Experiment With Sputnik III Soon

Lucien Barnier, scientific editor for L'Humanite, Paris Communist daily, said in Lausanne after his return from the USSR that the USSR will launch a third sputnik in a few weeks and that the Soviets will try to create living matter using inorganic matter and cosmic rays. The third satellite, he explained, will contain a mixture of ammonia, methane, steam, and carbonic acid, reproducing the composition of the earth's atmosphere toward the beginning of the first era. The action of cosmic rays on this mixture will possibly verify US and Soviet hypotheses about the origin of life. (Paris, Le Monde, 28 Feb 58, p 7)

Soviets Prepare to Send Second Dog in Satellite

Moscow, 17 February (AFP) -- The Soviets are actively preparing to launch new sputniks and think that they will be able to bring their "passengers" back to earth alive, according to Ada Kotovskaya, Soviet physicist, in an article in Sovetskaya Zhenshchina. She added that the problem of survival under conditions of interplanetary flight seems to have been solved. Mme Kotovskaya also said that a small dog named Alpha is now being given special training for her flight on the next sputnik, which, according to Mme Kotovskaya, will be equipped with improved instruments which the first two satellites did not have. (Paris, Le Monde, 18 Feb 58)

Sputnik II Schedule

At 0600 on 11 March Sputnik II completed 1,841 revolutions around the Earth.

According to the 11 March 1958 notice in Izvestiya, Sputnik II can be seen with the naked eye before sunrise from 48° to 62° North latitude and after sunset from 12° to 30° South latitude. (Moscow, Izvestiya, 11 Mar 58)

Soviet Earth Satellite Observation Program Discussed

In response to the many letters received by the editors of Pravda asking how satellite observations are conducted, Alla Genrikhovna Masevich, deputy chairman of the Astronomical Council of the Academy of Sciences USSR, published the following reply in a recent issue of that newspaper.

More than 3,000 students, a large number of aspirants, instructors, and scientific associates of state universities and pedagogical institutes of our country began regular observations of Sputnik I on 4 October 1957. At present, in 70 Soviet stations organized by the Astronomical Council of the Academy of Sciences USSR, together with the Ministry of Higher Education USSR and republic ministries of education, thousands of visual observations have already been conducted.

For visual observations in the USSR, a special AT-1 astronomical telescope was designed. It is a wide-angle portable telescope with six times magnification. At every station, there are 30 AT-1 telescopes and special equipment for recording the time of passage of the satellite.

A very important merit of visual observations is the fact that they do not require extensive processing, and even in the course of an hour, the results may be used for making more precise subsequent calculations.

To be sure, visual observations cannot give a high degree of accuracy. They are like the first stage of optical observations, which are necessary in order not to "lose" the satellite, and in the first approximation to determine more precisely its orbit. They play a major role in a subsequent stage of the life of the satellite, when it begins to enter into the Earth's atmosphere. At that time, the changes in its orbit occur very rapidly and irregularly, so that forecasting these changes becomes very difficult. In that case, the installation of an "optical barrier" consisting of 30 telescopes in one line is most effective. Such "barriers" were used for observing the rocket-carrier of Sputnik I and the satellite itself in the latter days of their life.

In spite of the fact that during the previous 4 months, cloudy weather prevailed over the major part of the USSR, more than ten, and in certain cases even 40 observations, were conducted daily by stations. Such a great number of observations under extremely unfavorable meteorological conditions were the result of the persistence and great interest in this new work by the students and instructors of the universities and pedagogical higher educational institutions which were conducting this work in addition to their basic responsibilities. Enthusiastic observers took turns watching at the stations, even in cloudy weather, hoping that the slightest break in the clouds would make it possible for them to see the artificial moon.

Many valuable results of observations were obtained from the stations operating at Pulkovo, Moscow, Uzhgorod, Arkhangel'sk, Riga, Kiev, Yakutsk, Vil'nyus, Tartu, Abastumani, Frunze, and other localities.

As experience showed, a majority of stations visually determined with the aid of the AT-1 telescope the position of the satellite with an accuracy to within several tenths of a degree. The determination of the moment of passage of a satellite is conducted less competently and only at better stations is an accuracy to within 2-3 tenths of a second achieved. Here, the so-called "personal" error of the observer enters in. Besides, the inaccuracies of the visual method itself are conditioned by "unforeseen" errors, among which may be numbered, for example, observation of a meteor or exhaust flame of an airplane mistaken for a satellite.

Many concrete suggestions for improving the method of visual observations presented themselves. Valuable suggestions were realized at the Odessa, Chardzhou, Moscow, Pulkovo, and other stations. The major work of organizing visual observation stations and developing a method of observations was performed by the scientific associates of the Astronomical Council of the Academy of Sciences USSR, A. M. Lozinskiy, Ye. Z. Gindin, and G. A. Leykin. At the Crimean Astrophysical Observatory of the Academy of Sciences USSR, experimental works are being conducted on attaching to the AT-1 telescope a photoelectric eye -- a photoelement coupled with precision clocks for automatic recording of the moment of passage of the satellite.

At certain stations, together with visual observations, the satellite is photographed with the Kiev or Gor'kiy cameras. The time of opening and closing of the shutter is fixed with the aid of precision clocks.

Precision photographic observations are of major significance. At the astronomical observatories, the satellite is photographed with the aid of a wide-angle camera with a "Uran-9" objective and an automatic shutter. Similar cameras, as is known, are used for photographing meteors.

During the satellite's passage across the field of vision, 3-4 exposures of one to seconds' duration are made. On the photograph, the trace of the satellite is correspondingly indicated as interrupted several times. The moments of opening and closing of the shutter are recorded on a chronograph of the time service. With the aid of such a shutter, the moment of passage of the satellite is determined with an accuracy to within 2-3 hundredths of a second

The shutter design of the 24 specially made cameras was developed by A. A. Mikhaylov, chairman of the Astronomical Council and a Corresponding Member of the Academy of Sciences USSR and V. V. Podobeda, deputy director of the State Astronomical Institute imeni Shternberg. A group at the Odessa Observatory made several other types of this shutter for the Odessa, Kharkov, L'vov and Kiev observatories. With the aid of a camera equipped with still another automatic shutter, photographing of the satellite at the Ashkhabad and Stalinabad observatories is being conducted. An even more precise method of recording the moment of opening of the automatic shutter was developed by Yu. N. Lipskiy, a senior scientific associate.

Regular photographic observations are being conducted in Pulkovo, Ashkhabad, Odessa, Kharkhov, Kiev, and other observatories. In the first quarter of 1958, the astronomical council plans to complete equipping 24 stations for photographic observations.

The network of stations conducting photographic observations with wide-angle cameras makes it possible to make more precise the prediction of the passage of the satellites, which is necessary for switching into operation the large astronomical telescopes. Such type of "nonmaneuverable" instruments have to be set up in advance. Therefore it becomes necessary to know with great accuracy in what part of the sky the satellite will appear so that its trace falls on the plate located in the telescope. Large telescopes make it possible to determine the position of the satellite with approximately ten times more precision.

Highly accurate observations are of great scientific value. They permit our obtaining new data on the shape and structure of the Earth, the distribution of its mass, and other results.

Methods of precise recording of satellites with the aid of existing astronomical telescopes and the use of a new technique were developed in a number of astronomical institutions. In the astrophysical observatory in Alma-Ata in the Astronomical Council, in the State Astronomical Institute imeni Shternberg in Moscow, the observatory imeni Engel'gardt in Kazan, in Pulkovo Observatory, and others.

Since the launching of the satellites, the Astronomical Council regularly receives communications on the results of visual and photographic observations from observatories, observation stations, and individual persons from other countries. Especially valuable data on observations were received from the observatory at Skalnate Pleso in Czechoslovakia. Observation data regularly is received from the Royal Observatory in Edinburgh, Scotland and from the observatories at Purple Mountain in Nanking, China; Brno, Czechoslovakia; Poznan, Poland; Potsdam, the German Democratic Republic; and many others. The southernmost part of the Earth from which observations are received is Santiago Chile. As of 4 March 1958, thousands of communications with the results of observations were received from foreign countries.

Soviet astronomers hope for a future expansion of international cooperation in this worthy matter.

After the launching of the US satellite, our southern stations were prepared for its observation, but because the inclination of its orbit to the equatorial plane is only 33°, observations of the US satellite even from our southernmost stations situated at a latitude of 38° is extremely difficult. Because of this, conditions were extremely disadvantageous for observing the US satellite during February. (Moscow, Pravda, 4 Mar 58)

Soviet Radio Amateur Journal Awards Prizes

The editors of Radio, the Soviet radio amateur's official publication, after examining the results of the work of radio amateurs in monitoring Sputnik I signals and considering the opinions of the Academy of Sciences USSR, awarded incentive prizes to the following radio amateur clubs and amateurs:

First prize of a "Temp-3" television set was awarded to the Khabarovsk radio club, whose group (A. Gorkovenko, V. Shopin, V. Shamrayev, V. Mikulich, M. Snytko, and others) participated actively from the start, compiled a graph of the field intensity, and made 60 tape recordings.

Second prize of a "Daugava" radio receiver was awarded to the Magadan radio club, which made 120 contacts in 5 days. V. Shtykhno, S. Burechek, B. Vorona, G. Solovkov, A. Kozlov, and others especially distinguished themselves.

Third prize of an "El'f - 6" tape recorder was won by radio amateurs of the Leningrad City DOSAAF radio club. Radio amateurs Noskov, Pramskiy, and Pidlasnyy made 23 contacts at 40 Mc and 53 contacts at 20 Mc.

Radio amateurs whose observations were of special value to science were awarded incentive prizes consisting of radio receivers, photographic equipment, and watches. Among the recipients were S. M. Mikheyev (Leningrad), B. Ya. Greyzha (Riga), I. A. Naroditskiy (Omsk), S. Ye. Gaintsev (Barnaul), V. I. Anikin (Gor'kiy), S. N. Kiknadze (Tbilisi), K. A. Kravets (Ufa), V. M. Levchenko (Yerevan).

All radio amateurs who participated in the observation of Sputnik I signals will be sent a souvenir confirmation card, and the most active amateurs will receive a diploma from Radio.

In connection with observations of Sputnik II, the editors of Radio have established incentive prizes and diplomas for DOSAAF radio clubs and individual radio amateurs. (Radio, No 12, Dec 57, p 23)

Satellite and Rocket Investigations of the Earth's Magnetic Field

The program of the IGY provides for the conducting of geomagnetic measurements by artificial satellites and rockets through which experimental data on the spatial distribution of the Earth's magnetic field in the upper altitudes can be obtained. Some of the geophysical and technical aspects of this type of measurement are considered in an article entitled "Investigation of the Earth's Magnetic Field by Artificial Satellites and Rockets", by N. V. Pushkov and S. Sh. Dolginov.

The authors first present a discussion of the basic problems of geomagnetic measurements in satellites and rockets, in which the magnetic field of the Earth and its pecularities, the problems which can be solved by magnetic measurements in rockets and satellites, and the possibilities presented by satellites in the investigation of the Earth's magnetic field are given in some detail.

The natural magnetic field which surrounds the earth and acts on the motion of charged particles found in the upper ionized layers of the Earth's atmosphere, to which the particles are attracted from the sun and outer space, has a permanent and variable field. To the former belong the long-term variations of the magnetic field, and to the latter, the magnetic storms, pulsations, diurnal variations, etc. Studies of the permanent field have shown that it is almost wholly caused by sources in the earth. Studies of the daily variations and magnetic storms have shown that the greater part of them (about two thirds) are caused by sources outside the Earth's surface and the balance by sources inside of it.

The discovery of the ionosphere and the close connection between variations in the Earth's magnetic field and in the ionosphere has given rise to the acceptable theory that magnetic storms and diurnal variations are caused by electrical currents in the ionosphere.

Magnetic measurements by satellites and rockets may reveal systems of currents in the ionosphere, evaluate their density, and give conclusive information concerning the existence of electrical currents outside the ionosphere. The magnetic field of a system of currents is defined as the difference between the measured values of a field and those calculated in an assumption of the action of a certain permanent field. For calculating the permanent field at various altitudes, an empirical formula is used in which the potential of the Earth's magnetic field is expressed by a series of spherical functions.

Magnetic measurements in satellites and rockets can give experimental data on the fading of magnetic anomalies and other pecularities of the magnetic field as distance from the Earth increases. This information can be used in checking the various assumptions concerning the depth of the sources of regional magnetic anomalies, which will have great value in the study of the Earth's internal structure. The compilation of magnetic measurements in satellites from determinations of the distribution of masses in the Earth which are made on the basis of the observation of perturbations in the satellites' orbits, can also be used to establish the connection between gravitational and magnetic anomalies created by the nonuniform distribution of masses at great depths.

At present, in their initial stages of development, rockets and satellites can be used mainly for investigating over-all field distribution at high altitudes and clarifying and evaluating the electric current systems of diurnal and solar variations and magnetic storms.

Magnetic measurements by rockets will be made in the high and low latitudes during the IGY to obtain a clear explanation of the role each ionospheric layer plays in the creation of current systems. The great shortcoming in the use of rockets for measurements, lies in the short period of their duration and in the fact that they relate only to the small region about the rockets' line of flight. To study the spatial distribution of the field and its temporary variations, a large number of repeated measurements must be carried out at many points. However, due to the great expenditures involved, measurements of the magnetic field in this manner will possibly be made only in the most interesting points and during the most interesting periods of time. The best locations will be in the regions where the aurorae most frequently appear, the Arctic and the Antarctic, to discover and evaluate the intensities of the linear currents which arise here during magnetic disturbances. The most propitious time will be selected on the basis of forecasts of magnetic disturbances and observatory data on variations of the magnetic field.

Magnetic measurements by satellites will be less accurate than those by rockets, since the smaller size of the satellites will not permit delivery of the sensitive elements which will perceive the field at great distances from the magnetic masses and other sources of disturbances. The unoriented satellite will be less stable than a rocket. It will be considerably more difficult to tie in satellite measurements to ground measurements. The satellites' greatest advantage will be that its measurements will be extended over a longer period. Artificial satellites can therefore be used not only for investigations of the spatial distribution of the magnetic field, but also for investigations of temporary variations of the field by repeated measurements over one and the same spot.

Aims of these measurements are (a) the investigation of the spatial distribution of the permanent magnetic field around the Earth; (b) the evaluation of the spatial distribution and altitude of the system of electrical currents in and beyond the limits of the ionosphere; and (c) the investigation of the heterogeneous structure of the ionosphere.

The detection and evaluation of current systems can be accomplished by various means. The satellite traverses the current layers, moving over, under, or in them. The movement of a satellite in a layer can be determined in the case of the heterogeneous distribution of ionization in it in a horizontal and vertical direction. Observation of winds in the ionosphere indicate that such a heterogemeous ionization distribution actually does occur. In the presence of this heterogeneity and the local strengthening and weakening of ionospheric currents, the magnetometer readings will be strongly fluctuating. By separating the slower fluctuations, caused by the nonuniform distribution of the constant field, it will be possible to form an estimate of the size of the ionospheric variations and their intensities. With the exception of the time of its rise and fall, a long-lived satellite can be in the ionosphere only during its motion in an elliptical orbit, and then only in its perigee.

From the viewpoint of investigating the over-all distribution of the magnetic field and the systems of polar currents, the most suitable orbit for a satellite is an orbit passing through the Earth's geographic poles. During the satellite's motion around the Earth, its orbit, because of the Earth's rotation, will shift to the west. Thus, the satellite's instruments will produce a magnetic survey of the Earth. If the satellite is launched at a certain angle to the Earth's axis of rotation to conduct measurements in the region of the pole of the Earth's homogeneous magnetization, then the angle should not exceed 10^{o}.

Polar and near-polar orbits will require a considerably larger number of ground stations than equatorial orbits. However, equatorial orbits may be used for the solution of a lesser number of problems, mainly for verifying the hypothetical circular equatorial current outside the ionosphere.

Data on aurorae and on changes in the magnetic field and the ionosphere from the greatest possible number of points is very important for interpreting the results of magnetic measurements made by rockets and satellites.

Concerning magnetometers for measurements in satellites and rockets, the most valuable results in measurements of the magnetic field by satellites and rockets could be obtained with magnetometers measuring the components of the field or the scalar magnitude of the field vector and its direction. There is a possibility of using such magnetometers in the future. Magnetometers based on nuclear induction and with magnetically saturable sensing devices measuring the scalar magnitude of the full field intensity will apparently be used in the very near future. These are the proton magnetometers (magnetometers based on measuring the frequency of the free precession of protons) and the self-orienting full vector type magnetometer.

The nuclear-induction method of measuring field intensities is based on the use of the phenomenon of the free precession of protons in the outer magnetic field. The precession frequency of protons possessing a magnetic and mechanical moment is determined by the Larmor relation, $W=\gamma H$, where γ is the gyromagnetic ratio and H is the potential of the magnetic field. Applying this relation, it is possible to determine the frequency of the free precession of the protons and, if the gyromagnetic ratio is known, to determine the field potential.

The measurement of the field on the basis of nuclear induction possesses appreciable advantage as compared to other methods: the measurement of the field is reduced to frequency methods; the accuracy of the measurement does not depend on the design parameters of the sensing device and the channels forming the signal; the magnetometer readings are given in absolute units; the sensing device and the channels forming the signals are in principle free of zero value changes, and the metering accuracy is determined solely by the accuracy of the frequency standard; the result of measurement by a

Short-period forecasts, compiled by NIZMIR, are of two types: current (semidiurnal) and immediate future (5-day). The first type has an operational character and the second serves for orientation in selecting the best wave lengths for communications in the next few days. Just as a weather report, the semidiurnal forecast is broadcast twice daily over the radio network of the meteorological service. These short-period forecasts are of great significance for radio communications. During their compilation the condition of the ionosphere at that moment, the changes which will take place in the next few hours, and the possibility of the appearance of magnetic storms which interrupt communications must be considered.

Such a forecast is compiled as follows:

The appearance of a sunspot is noted by an astronomical observatory. At the moment the spot appears, magnetic fields usually arise which produce strong currents in millions of amperes. The direction of the magnetic fields can either promote the ejection of material particles into interstellar space or prevent it. If such an ejection of matter takes place, then, approximately in a day or two after the solar flare, material particles reach the Earth's atmosphere and intensively ionize its upper layers, especially in the polar areas where these particles are "collected" by the Earth's magnetic field. The light of ionized gases here appears in the form of polar lights which usually are accompanied by magnetic storms disturbing communications.

But radio communications can be distributed even when a solar flare is not accompanied by corpuscular radiation. In such a case, the Sun intensively radiates electromagnetic oscillations close to the frequency of X rays. Arriving in the upper layers of the Earth's atmosphere 7 minutes after the flare, this radiation sharply changes the state of the ionized layers and can produce a sudden blackout of short-wave radio communications. This effect of sudden ionospheric disturbance is known as the Dillinger effect.

By observing solar activity and the appearance of sunspots in such a manner, the formation of magnetic storms and short-wave communications disturbance can be forecast to a remarkable degree. Observation data of solar activity are supplemented by an analysis of solar radio emission at the moment of flares. Reception of these emissions is done with the aid of a radio telescope. Changes in the critical frequencies in the ionosphere, caused by solar flares, are fixed by ionosphere stations, which make soundings of the ionosphere by the use of radio waves. All these data make it possible to evaluate more completely the character and intensity of the processes occurring on the Sun and in the upper layers of the Earth's atmosphere and to draw conclusions on the probability of a communication disturbance.

Measurements which are made during the investigation of solar activity are noted for high accuracy. Thus, a unique magnetometer designed by E. Mogilevskiy, a NIZMIR associate, can determine the intensity of magnetic fields on the Sun with a 5-10% accuracy (several tens of a gauss).

The investigation of the multiform properties of the ionosphere is very important for accurate compilation of forecasts. Therefore, not only are the composition and structure of the ionosphere studied but also the cyclic changes occurring in it, nonuniformity of its structure, etc.

Radio sounding, in particular, successfully aided in determining the rate of shift of the air masses at altitudes of 100 km and higher.

Other interesting phenomena occurring in the ionosphere are investigated. It was established, for example, that the ionosphere is subject to other phenomena similar to the tides in the seas and oceans. The cause of sudden ionospheric disturbance (Dillinger effect) is manifested. It shows that photons flying from the Sun and operating in the depths of the ionosphere intensively affect the lower ionospheric layers in which radio-wave absorption is especially great. That is why even the longer waves in the short-wave band which usually are reflected from the upper, weakly ionized layers are absorbed. It was also found that a peculiar "anti-ionization" (neutralization of ionized particles) could result during the ejection of charged particles from the Sun. Even now many "secrets" of the ionosphere remain undiscovered. It is not clear, for example, what causes the ionization of the F-layer which exists both day and night.

The study of magnetic storms and aurora is closely connected with the investigation of the ionosphere. On the basis of theoretical calculations, N. Ben'kova, Doctor of Physiomathematical Sciences and a NIZMIR associate, determined the order of large electric currents formed in the ionosphere under the influence of magnetic disturbances. The conductivity and dielectric constant of the ionized layers were calculated according to the character of magnetic storms.

Interesting work on aurora studies is being conducted at the Murmansk Branch of NIZMIR, which is the major station in the USSR for the investigation of these natural phenomena. An original photographic installation here makes it possible to photograph aurora and to measure aurora altitude and duration. The investigations made by S. Isayev, chief of the branch, have produced interesting material for scientific work in this field.

The study of the peculiarities of propagation of lost superlong waves is of great practical significance. It was shown that propagation has a waveguide character in these waves. In the investigations which were conducted at NIZMIR by V. Kashprovskiy, Ya. Al'pert, S. Borodina, and D. Frigel', such natural "radiators" of superlong waves as storm discharges were used. On the basis of these investigations a system of direction finding of storms was created which makes it possible to determine storm centers within a radius of several thousand kilometers. The accuracy of the direction finding at a distance of 3,500 km is -10% for a single discharge and -3% for a set of storm discharges.

At present in the Soviet Union there is a network of stations conducting direction findings of storms. Such investigations aid in correctly compiling weather forecasts especially important for aviation and agriculture.

Of great interest for contemporary geophysics is the investigation of cosmic rays which reach the Earth from outer space. The Earth's atmosphere, especially its upper layers, is a "shield" for all living things on Earth. Cosmic rays reaching the atmosphere are rendered harmless and no longer dangerous to living substances. A network of special cosmic stations in the USSR conducts observations of these radiations. These works have acquired especially great significance since the launching of Sputnik I. The work of the young researcher L. Dorman, conducted at NIZMIR, on the study of the effect of meteorological factors on the intensity of cosmic radiation has received a high evaluation from specialists not only in the USSR but also abroad. This dissertation work has been published as a separate book.

Various branches of science and technology make wide use of the results of investigations on the permanent magnetic field of the Earth which are conducted by NIZMIR. The institute compiles precision charts of the magnetic field on which are formulated navigational charts for navigators of ships and aircraft. Also, magnetic surveying makes it possible to determine the regions of bedding of useful mineral ores, and this considerably lightens the prospecting work of geologists. On the basis of the study of Earth currents and the Earth's permanent magnetic field, an interesting instrument for determining the speed of sea currents was created. V. Novysh, an associate at the institute, designed the instrument.

The compilation of forecasts of radio-wave propagation conditions and those more interesting geophysical investigations which are conducted in the institute would be impossible without the use of the observation results of peripheral stations. At present, NIZMIR maintains close communications with nearly 100 observation stations located at various points in the Soviet Union from which the institute receives data of diverse observations. In connection with the IGY, the work of the institute has acquired an international character. NIZMIR is a world center for the collection, storage, and dissemination of data of IGY observations. Data of observations on geomagnetism, ionosphere, aurora, solar activity, cosmic rays, etc., are sent to the institute.

In addition, NIZMIR is the European-Asian regional center for IGY communications, collecting and disseminating current information on the state of solar activity, magnetic field, and ionosphere and radio-wave propagation. In addition to some of the other socialist countries China and Yugoslavia belong to this region. NIZMIR exchanges information with the other regional centers and maintains communication with the International IGY Center.

The world's only nonmagnetic ship, the Zar'ya, whose creation was a major achievement of NIZMIR, is studying the Earth's magnetic field and, in addition, is checking the instrument readings of the various magnetic observatories of the world.

For correctly calculating radio-wave propagation, norms of the electromagnetic field of radio stations must be worked out. In this connection, NIZMIR plans to compile a catalogue and a map of field intensity level of so-called atmospherics.

Ivanitskiy concludes his article with the mention that the very large work of compiling a map of the conductivity of the soils of the USSR is impending. Such a map is required for the correct selection of the power of radio broadcasting stations in the USSR. NIZMIR plans to use the assistance of a wide mass of radio amateurs in accomplishing this work. (Radio, No 12, Dec 57, pp 20-23)

Soviets Producing Supersensitive Semiconductor Bolometer

One of the laboratories of the Institute of Physics of the Academy of Sciences Ukrainian SSR has created a bolometer which uses a semi-conductor element.

In June 1957 the Experimental-Production Division of the institute began series production of this bolometer.

The bolometer is enclosed in a metal box. One of the wall has a round opening through which invisible heat rays pass, are reflected from a spherical mirror, and fall on the tiny "heart" of the bolometer -- a supersensitive semiconductor element which is not much larger than one square millimeter and less than 7 microns thick. This hardly visible part sensitively reacts to very insignificant temperature changes of the order of 0.000001 degree. The apprehended heat signal is transmitted to a recording instrument. The semiconductor receiver of radiant energy does not require a complex amplifier circuit and can operate generally without amplification and can be converted simply. (Moscow, Promyshlenno-Ekonomicheskaya Gazeta, 26 Jun 57)

Revised Computation for Lunar Parallax

In an article entitled "The Lunar Parallax Constant," by F. Kh. Perlin, which appeared originally in Byul. In-ta Teor. Astron-AN SSSR, Vol 6, No 8, 1957, pp 566-567, the author derives the most probable numerical value for the constant of lunar parallax in accordance with contemporary data on the values of fundamental astronomical constants. He describes the so-called dynamic method based on the relationship between the parallax of the Moon, its mean diurnal movement, form, dimensions, and data on the Earth's gravitational field. Perlin compares this with the trigonometric method and finds divergences to 0".4. A formula differing from the generally accepted De-Sitter formula is derived, and the parameters which enter into it are established.

Using recent data on the size and shape of the general terrestrial ellipsoid and on heights of the geoid above this ellipsoid, the author recomputes the value of $\pi'_{☾}$ obtained trigonometrically by Crommelin from observations of Crater Moesting A, and finds π' observed = 3422".47 ± 0".9. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 11, Nov 57, Abstract No 8736, by I. D. Zhongolovich)

Work of Astrobotany Sector Noted

A work titled "Catalogue of Colors of Stars in Selected Regions of Kapteyn No 92-109. Obtained by the Longitudinal Spectrograph Method," by K. I. Kozlova and Yu. V. Glagolevskiy, which appeared originally in Tr. Sektora Astrobotaniki, AN KazSSR (Works of the Astrobotany Sector, Academy of Sciences Kazakh SSR), 5, 1957, pp 6-41, is described as a continuation of work done by Tikhov (Referativnyy Zhurnal -- Astronomiya i Geodeziya, 1953, Abstract No 896). The color of the stars is determined by visual evoluation on a 10-ball scale according to extra-focal star images on plates made with the help of a badly achromatized objective. Tables and graphs are presented showing distribution of stars by color in the indicated regions. (Referativnyy Zhurnal -- Astronomiya i Geodeziya, No 11, Nov 57, Abstract No 8889)

Work at the Wahnsdorf Observatory as Part of East German IGY

Work at the Wahnsdorf Observatory, one of the stations participating in East Germany's IGY activities, includes air and rain-water analysis and measurement of electricity and radioactivity in the air. In connection with the IGY, the observatory is measuring light rays from the Sun; this is also being done at the Fichtelberg and Heiligendamm stations. In addition to Potsdam, Wahnsdorf is the only other station observing the ozonosphere, and the observatory possesses the only Dobson spectral device in East Germany. The Wahnsdorf station measures and evaluates ozone in the soil (Bodenozon) for the country. (Dresden, Saechsische Zeitung, 20 Dec 57, p 8)

Yugoslav Ionosphere Research

The first photograph of ionospheric phenomena above Belgrade was taken with an automatic camera in the Observatory for Ionosphere Studies (Opservatorija za ispitivanje jonosfere), which is part of the Division for Radio Communications in the "Nikola Tesla" Institute for the Study of Electrical Phenomena (Institut za ispitivanje elektricnih pojava "Nikola Tesla") in Belgrade.

A. Misic reports in an article titled "First Picture of the Ionosphere Above Our Country" that the ionospheric recorder was built as part of a Yugoslav project initiated by Engr Dejan Bajic, director of the observatory. Engr Vladimir Klimecki assisted in its construction. The recording of ionospheric data is completely automatic on a continuous basis. The main part of the apparatus functions on the principle of radar. It contains over 100 electronic tubes besides two cathode-ray tubes. The camera, built into the apparatus, records the data and the time at which the photographic record was made of the ionospheric phenomena. (Belgrade, Politika, 10 Jan 58, p 5)

III. METEOROLOGY

Radar Method of Investigating Structure of Showers and Storms

Ye. M. Sal'man in an article entitled "Radar Investigations of the Structure of Showers and Storms," which originally appeared in Trudy Glavnoy geofizich. observatorii im. A. Voyeykova, No 72, 1957, pp 46-65, describes a radar method of investigating the structure of showers and storms based on quantitative measurement of the intensity of the radio echo. This method expands the possibility of investigating atmospheric formations and may be used for solving a number of problems connected with the physics of the formation and falling of precipitations. (Annotirovannyy Ukazatel' Literatury po Radioelektronika, No 24, 1957, No 200)

IV. OCEANOGRAPHY

Ob' Heads for Australia After New Zealand Visit

The Soviet diesel-electric ship, Ob', is reported in the Tasmanian Sea en route to Australia several days out of Wellington. A glowing account of the warm welcome accorded the ship's complement during its New Zealand stay is reported in a radio message by First Mate V. Tkachev. The visit, resulting from an invitation to attend an International Antarctic Conference, is said to be the first in that port for a Soviet ship in 15 years. Soviet scientists of the Ob' Expedition presented 17 reports at the conference in which scientists from eight nations participated.

Among the highlights of the 8-day stay, were a visit by Professor V. G. Kort and Captain A. I. Man of the Ob' to the Mayor of Wellington, and a visit by Prime Minister Nash of New Zealand and other officials on board the ship. The ship was visited by about 7,500 people despite hurricane-strength winds during the stopover. Members of the expedition engaged in sightseeing trips of the city and vicinity. One group made a 1,000-mile train trip into the interior. (Moscow, Izvestiya, 5 Mar 58)

East German Enterprise Equips Ship for Scientific Expedition

The People-Owned "Carl Zeiss" Enterprise in Jena has produced precision optical instruments required to equip the sailing ship Xarifa for a 2-year scientific expedition. According to the article, the ship, which provides working areas for eight scientists and is equipped with all aids required for research work and deep-sea diving, will have an especially constructed television camera for use in making under-water cultural and documentary films. Tasks of the expedition, according to the article, have been set by a committee of 27 professors in East German, West German, Austrian, and Swiss universities. The route of the expedition, as reported in the article, is through the Indian Ocean, the China Sea, and the Pacific Ocean. Special attention will be given to investigation of the laws governing formation of coral reefs, investigation of the activities of certain animal groups, and investigation of land fauna. (Rostock, Norddeutsche Neueste Nachrichten, 19 Oct 57)

New Voyage of the Mikhail Lomonosov

The 18th of February saw the departure from Riga of the Mikhail Lomonosov, flagship of the research fleet of the Academy of Sciences USSR. The new voyage is being made under the IGY program.

Before its departure, a press conference was held by A. A. Ivanov, Doctor of Physicomathematical Sciences, Chief of the Expedition. Ivanov is quoted as saying that in contrast to the previous voyage, a great deal more investigatory work would be a part of the present program. Scientific observations will be made in the North Atlantic after which the ship will cross the equator. The results of investigations in the waters off the West Coast of Africa will be of great interest.

A group of scientists from East Germany will board the ship at Rostok. These scientists will work with the Soviet scientists in investigatory work under the IGY program. [Comment: The same arrangement with regard to scientists from East Germany was followed on the Lomonosov's first trip under the IGY program, when it left Riga on 21 October 1957.] (Moscow, Vodnyy Transport, 26 Feb 58)

Soviets Report Cloud-Seeding Successes

Successful experiments on cloud dispersion were conducted last fall in the Caucasus mountains by the El'brus Expedition of the Institute of Applied Geophysics of the Academy of Sciences USSR. Out of 75 experiments, 71 are reported to have resulted favorably with a dispersal of clouds within a matter of several minutes. An experiment carried out in the valley of Alazani (the vineyard kingdom) is described as follows: The appearance of a storm cloud, with the threat of hail, led the scientists of the expedition to send up a plane. In the "course of 6 minutes of flying the plane over the cloud" the dispersal was accomplished. Photographs recording the experiment were made by Vasil'yevich Chudaykin, engineer. Two of these accompany the article, published in Izvestiya and written by P. Sorokko, Izvestiya correspondent.

The Elbrus expedition is composed of 37 scientific associates under the leadership of Georgiy Konstantinovich Sulakvelidze, Doctor of Physico-mathematical Sciences. The expedition's base is located in the upper Baksanskiy Pass at an altitude of 2,200 meters above sea level. Four more stations are situated several hundred meters higher. From these a series of paths radiate in various directions to temporary observation camps.

In their work on cloud-dispersion, the members of the expedition work at different altitudes, enabling them either to walk up to the clouds or into them. Thus the most favorable conditions for observations and investigations are created.

Spring of 1958 will see members of the expedition conducting practical experiments on cloud dispersion in an area of 80,000 hectares. This will be the final stages of the great works of this collective of scientists. Preparations are now under way for the fight against storm clouds in such a great area.

The work of the expedition includes studies on snow slides which give the project and building organizations the necessary data needed for their building programs. (Moscow, Izvestiya, 2 Mar 58)

Soviet Methodology Employed in Oceanographic Investigations

A recently published Trudy (Works) of the Institute of Oceanology, Academy of Sciences USSR, Vol XXIV, 1957, is a compilation of articles of a methodological nature, which are actually a generalization of the experience of oceanological investigations. These were accumulated by the expeditionary ship Vityaz' during its operations from 1949 to 1955. The investigations conducted by the Vityaz' form the basis of this collection in which are included also the experiences of other small expeditionary ships -- the Akademik Shirshov, Nerpa, Gidrolog, and others.

The first article, "Techniques of Hydrologic Work on the Open Sea," by V. A. Burkov, K. T. Bogdanov, A. Ye. Gamutilov, and V. A. Shireya, can be considered as a supplement to existing instructions on deep-water hydrologic observations. It is not in the accepted sense an independent set of instructions or handbook, but can serve only as a supplementary manual in which recommendations are given for increasing the exactness, speed, and reliability of the work. With the exception of certain recently developed features of the work using instruments, neither instruments nor examples of their application are described. The article is devoted mainly to methods of processing observations. Many original methods of accelerating and improving this work are recommended, and special auxiliary tables are included.

The methods of determining the temperature, salinity, and currents in the open sea, which were used by the Institute of Oceanology of the Academy of Sciences USSR, are fully treated. The investigations of the Institute are distinguished from investigations of previous years by a number of features. These differences are attributed to the fact that the work conducted in the institute was on a high technical level, and this in turn is related to the institute's expeditionary ship, Vityaz'. The ship's high-level technical and expeditionary equipment permitted hydrologic observations and processing of materials as follows: (1) obtaining mass observations during long voyages, (2) processing the observations aboard ship, (3) operating at any ocean depth and in any weather, and (4) anchoring at any ocean depth. Another factor which led to the change in existing methods of hydrologic observations and processing was a new observation technique which is, however, still in the proving stage.

New instruments used by the expeditions include: a bathythermograph, the current recording system of the Vityaz', the Yu. K. Alekseyev printing current-recorder system (BPV-2), an electromagnetic current meter (EMIT), and the navigational equipment -- radar.

A great deal of attention is given to the documentation of observations both on deck and in the laboratory.

Chapter headings of the first article are: I. Observations on Temperature and Salinity, covering the preparations for observations and the making of observations at hydrologic stations; II. Determining the Salinity of Sea Waters, describing the practical application of the titration method (Knudsen); III. Observations on Currents, describing briefly the preparation of the ship and instruments for observations of currents, and work while the ship is drifting and while at anchor; (recommends certain locations for instruments on a ship, preparation of the instruments and gives type of data forms; shows system of instrument distribution used on the Vityaz' and the Logger); IV. Processing of Deep-Water Temperature and Salinity Observations; V. Processing of Observations of Currents; and VI. Recommendations for the Planning and Organizing of Expeditionary Voyages. An appendix contains samples of the blanks and forms used for recording and processing observations, tables for use in processing the observations, and a list of the equipment, instruments, and materials necessary for hydrologic expeditionary work.

The second article, "Manual on an Electromagnetic Method of Measuring Sea-Current Velocities From a Ship Under Way," by N. N. Sysoyev and V. G. Volkov, is intended to familiarize oceanographic workers with the physical principles of the electromagnetic method and with the method of electromagnetic measurement of currents (EMIT) and the operation of the apparatus. The EMIT method of measuring currents is fully described.

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The third article, "Standardization of Sea Plankton Investigations," by V. G. Logorov, acknowledges the need for an agreement on uniformity of the methods of catching and processing plankton, but does not describe all these methods and processing. It does, however, make a recommendation for each group of plankton.

The fourth article, "Acoustical Coupled High-Speed Bathythermograph," by V. G. Volkov and B. V. Shekhvatov, describes an instrument which was developed for use in determining water temperatures from the surface to great depths of the sea. The instrument is described as performing similarly to a radiosonde in transmitting its readings to a suitable receiver on the deck of a ship during its free descent into the water. The system and design of the bathythermograph are described. Several diagrams and pictures showing its parts and layout are included in the article. Its basic parts are a rapid response transducer, a converter, and a radiating apparatus enclosed in a watertight container. A photograph of the interior shows the frame of the "sonde," its stabilizer, the ultrasonic generator, discharge relay, storage capacitor, high-voltage battery, a filament battery, generator, and the temperature transmitter.

A test model of the "sonde" was tested in the Black Sea in the summer of 1956. Testing was done in the region of the Black Sea Experimental Scientific Research Station of the Institute of Oceanology, Academy of Sciences USSR (Gelendzhik), and in the region of the Sukhumi Experimental Station of the Acoustics Institute of the Academy of Sciences USSR.

On the basis of laboratory and open sea tests, it was asserted that instruments of this type could be widely used in hydrologic practice.

At present it is said to be the highest-speed bathythermograph; and with it it is possible to produce instantaneous survey maps of the temperature distribution in the upper layers of water. Another advantage of the instrument is that measurements can be made even without winches and cables.

Further work on the system and design of the thermosonde must be done in the direction of creating a portable, cheap, and dispensable instrument for work on a ship under way, and in improving the accuracy of the measurements of the developed model. (Trudy Instituta Okeanologii, Vol XXIV, 1957, 228 pp)

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